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CENTRAL FAX CENTER****DEC 01 2008****MAIL STOP APPEAL****PATENT
7863/80940****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Applicants: HALAMODA et al. Confirmation: 6117
Serial No.: 10/753,874 Group Art Unit: 3724
Filed: January 9, 2004 Examiner: P. Nguyen
For: DEVICE FOR PUNCHING GREEN SHEETS

BRIEF ON APPEAL

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22314

December 1, 2008

Sir:

Further to the Notice of Appeal filed July 29, 2008, appealing the decision of the Examiner finally rejecting claims 1-3, 5-7, 9-12, and 14-20, attached is Appellants' Brief on Appeal in connection with the above-identified application. Please charge the \$540 fee for submitting the brief to counsel's Deposit Account No. 06-1135.

12/02/2008 VBUI11 00000003 061135 10753874
01 FC:1402 540.00 DA

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Real party in interest

The real party in interest is GROZ-BECKERT KG, the assignee of record in connection with the present application on appeal.

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Related appeals and Interferences

There are no related appeals and interferences.

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Status of Claims

The following is the status of the claims in the present application on appeal:

Claim 1:	Rejected
Claim 2:	Rejected
Claim 3:	Rejected
Claim 4:	Cancelled
Claim 5:	Rejected
Claim 6:	Rejected
Claim 7:	Rejected
Claim 8:	Cancelled
Claim 9:	Rejected
Claim 10:	Rejected
Claim 11:	Rejected
Claim 12:	Rejected
Claim 13:	Cancelled
Claim 14:	Cancelled by concurrently filed Amendment
Claim 15:	Rejected
Claim 16:	Rejected
Claim 17:	Rejected
Claim 18:	Rejected
Claim 19:	Rejected
Claim 20:	Rejected
Claim 21:	Cancelled

Claims 1, 9 and 18 are each independent claims, with pending claims 2, 3, and 5-7 depending from claim 1, pending claims 10-12 15 and 17 depending from claim 9, and pending claims 19 and 20 depending from claim 18.

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Status of Amendments

An Amendment is being concurrently filed with the present Brief on Appeal cancelling claim 14 since it is identical to rejected pending claim 15. It is presumed that it will be entered. No other amendments have been filed subsequent to issuance of the final Office Action.

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Summary of Claimed Subject Matter

The present invention is directed to a device for punching holes in unfired ceramic substrates, so called green sheets for use particularly for electronic circuit boards. It is well known that circuit boards for electronic circuits are made of ceramic which then are provided with conductors on one or both sides as well as electronic devices. In order to connect conductors on one side of the board to conductors or components on the other side, so called vias are provided. A via is formed by a hole that is metallized during the production process in order to form an electrically conductive path from one side of the ceramic circuit board to the other.

It is nearly impossible to drill these holes into a fired ceramic board as precisely as desired and with high productivity. Therefore, the holes are punched into the ceramic sheet before it is fired. These unfired or "green" sheets, however, have a considerable thickness. While it is desirable for the thickness of the ceramic green sheet to be rather high in order to obtain a high degree of stiffness and rigidity, the diameter of the holes to be punched is becoming smaller and smaller as a result of decreased dimensions for the conductors and components. For example, while the desired diameter of the holes used to be much larger than 0.1 millimeters, the desired diameter of the holes is currently much less. In particular, diameters of 0.06 millimeters and less are to be achieved.

This desired decrease in the diameter of the holes to be produced created a problem in view of the design of the prior art punch. In the punch, the length of the cylindrical punching portion has to be equal to or greater than the thickness of the green

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sheet. Moreover, if the working part of the punch is used to guide the punch, the length of the working part has to additionally be increased. Examples of standard designs of punches of this type are shown, for example, in U.S. Patent Nos. 4,092,888 and 4,425,829, both of record in the present application. This type punch design works well if the hole to be punched is rather large compared to the thickness of the green sheet, e.g., see FIG. 1 of U.S. Patent No. 4,425,829. However, if the diameter of the hole is very much less than the thickness of the green sheet, then the ratio of the length to the diameter of the punching part will be too large, resulting in the punching part no longer being stable. This instability will cause the punching part of the tool to bend sideward and cause problems if pushed toward the green sheet.

The above described problem is solved by the punch according to the present invention which, as shown in Fig. 1 and as described in paragraphs 17 –20 of the present application, includes a lower tool and an upper tool 3, with the upper tool 3 being moveable linearly back and forth toward and away from the lower tool 2 on guides 4 and 5. A drive mechanism is connected to the upper tool 3 to move it linearly by a defined stroke toward and away from the lower tool 2.

The lower tool 2 includes a substantially flat support plate or receiving device 6 provided with a plurality of punched holes 7 at locations at which holes are to be formed in an unfired or green ceramic sheet 32 (see Fig 3) placed on the support plate or receiving device 6. For this purpose, a plurality of dies 8 are disposed on the upper tool 3 in alignment with the holes 7 in the support plate 6. The dies 8 are guided during their

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travel and a green sheet on the flat support plate 6 is held down by a plate 9, which is omitted in Fig. 1 for clarity but is shown in Fig. 2 and Partially in Figs. 3 and 4.

The plate 9 is connected to or part of the upper tool 3 and moveable with it. As can be seen in Figs. 2 and 3, the surface of the plate 9 facing the support plate 6 is provided with a stripper bushing 21 containing a stripper opening 24 which is aligned with an opening or punched hole 7 in a punching bushing 22 mounted in the support plate or receiving device 6. The punched hole 7 is a through bore that opens into a slug conduit 28 (See Fig 3) having a greater diameter than the punched hole 7.

As can be seen in Fig 2, and as described in paragraphs 21 and 22, the die has an elongated shaft 15 with a head 14 at one end secured to the upper tool 3. The die 8 is preferably provided with a separate drive mechanism (not shown) for moving it toward and away from the lower tool 2. The shaft 15 extend through a guide device 17 including an elongated bushing 18 mounted in a plate 19 connected to the plate 9 and provided with a central passage whose surface guides the movement of the shaft 15 and thus the die 8. The lower end of the die 8 extends into the stripper opening 24 of the stripper bushing 21.

According to the present invention, instead of the die 8 having two different diameter portions with the lower end or punching portion being smaller than the remainder of the shaft and extending into and being guided by the wall of the stripper opening, the punch or die 8 has three different diameters as can clearly be seen in Figs. 2-4, particularly Figs. 3 and 4. In particular, in addition to the cylindrical shaft 15, the lower operative or working portion of the die 8 is divided into a non laterally supported or

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unguided cylindrical punching part 26 at the lower end followed by a cylindrical guiding part 25 which is guided by the wall of the stripper opening 24. Consequently, the ratio between the length and the diameter of the punching part 26 is diminished, which results in an increased stiffness thereof. More specifically, in the punching device according to the invention, the die 8 has: 1) a thin short punching portion 26 having a diameter essentially corresponding to the diameter of the desired hole, and thus slightly less than the diameter of the punching hole 7 by a clearance amount; 2), a thicker intermediate guiding portion 25 with a slightly larger diameter corresponding to that of the stripper opening 24; and finally a shaft 15 having a still larger diameter that is a multiple of the diameter of the intermediate guiding portion 25.

As indicated above, the die 8 is mounted above the punching opening 7 in the substantially flat receiving face of the support plate 6 for the green sheet 32' which opening 7 receives the punching portion 26 of the die 8 during a punching operation as described in paragraphs 28 and 29 and as shown in detail in Figs. 3 and 4. The die is mounted so that its shaft portion 15 is guided in the bushing 18 while the cylindrical intermediate portion 25 is guided in the stripper bore or opening 24 of the stripper bushing 21. The length of the stripper opening 24 is greater than that of the cylindrical punching portion 26 of the die 8 so that the punching portion 26 can be withdrawn into the stripper opening 24 while a portion of the intermediate portion 25 is still in the stripper opening 24 and guided thereby. Thus the short punching portion 26, which is not directly guided by the stripper opening 24, is within the stripper when not in use and only exits the stripper opening 24 during a punching action. Moreover, the stroke of the

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drive mechanism is essentially equal to the length of the punching portion, e.g., see original claim 5, so that only the punching portion 26 at the end of the die 8 performs any punching or other material deformation actions on the green sheet, while the intermediate portion 25 provides only a guiding function for the die 8 near the punching portion 26.

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Grounds of Rejection

There are two grounds of rejections:

whether claims 9-12 and 16-20 are unpatentable under 35 U.S.C. §103(a) over Dietz (EP 64263A2) in view of Takashima et al. (U.S. 2004/0113979); and

whether claims 1-3, 5-7, and 15 are unpatentable under 35 U.S.C. §103(a) over Dietz in view of Saito (U.S. 5,848,563) and Takashima. Please note that although claim 15 was not mentioned in the first sentence summary of this ground of rejection in the final Office Action, it is mentioned in the text of the rejection in connection with the rejection of claim 5, and thus is included in this ground of rejection for purposes of this Appeal.

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Argument

Rejection of claims 9-12 and 16-20 under 35 U.S.C. §103(a)

In rejecting the claims over the patent reference to Dietz (EP64263A20 in view of the patent publication to Takashima et al (U.S. Pub. 2004/0113979), the Examiner has essentially taken the position that Figs. 1-4 of the Dietz reference show all of the claimed features except that the part 14 of Dietz is used as a guide for providing a hole with a chamfer or tapered end rather than as a punch; that Takashima teaches an operative 5 for making a hole with a tapered end having a first part 5c and a second part 5b as shown in Figs 1-3; and that consequently it would have been obvious to one skilled in the art to incorporate the second punching part 5b as taught by Takashima for the second guide part 14 of Dietz in order to speed up the process of making a hole with a tapered end since the tapered portion and the constant diameter portion are made in one step rather than two as taught by Dietz; and that such a combination would result in the invention defined in independent claims 9 and 18. It is initially submitted that one skilled in the art would not consider combining these references in the manner suggested by the Examiner, or in any other manner, since both references are directed to the solution of completely different problems in very specific areas of technology, which are far removed from the area of technology to which they are individually directed and to which the present invention is directed. That is, the Dietz reference is basically directed to enlarging openings in metal sheets or providing existing openings with enlarged tapered ends wherein excess metal moved due to the process must be accounted whereas the Takashima et al reference is directed to forming liquid nozzles

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having a taper at one end in very thin plates of metal. The present invention, however, is directed to a punch for forming cylindrical holes in a green ceramic sheet. Consequently, one skilled in the art faced with the problem solved by the present invention would not even consider the cited prior art references. Likewise, one skilled in the art having the Dietz reference, before him would not consider the combination suggested by the Examiner since the basic problems in dealing with the material being handled or operated upon are entirely different. Moreover, even if the suggested combination could in some way be made, it would result in the production of a hole with a cylindrical portion and a tapered portion whereas the punch according to the **present invention makes only a cylindrical hole** and has features either not found in or contrary to the teachings of the two cited references.

The Dietz reference is directed to a device for use with metal sheets wherein, as indicated above, completely different problems and conditions are involved. The device of Dietz as shown in Figs 1-3, which are the figures containing the punching element or die with the cylindrical guide portion 14, does **not punch** any holes in the metal sheet (11) or even remove any material from the sheet. Rather the Dietz device of Figs. 1 and 2 simply wishes to convert an existing hole or opening 16 in the metal sheet 11 to a countersunk hole (18 or 19) with a chamfered or conical tapered edge as shown in Fig. 2 of Dietz to receive the head of a screw. Note that in the Dietz device, the working part of the die of Dietz is the conical part 13, while the lower end portion 14 with the rounded nose simply serves as a centering guide for the die during the countersinking operation. That is, it extends into the opening 15 in the member 7 to center the die during the

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deformation process to form the hole with the tapered end as shown in Fig. 2. Moreover, the lower end portion 14 of Dietz not only serves as a general guide, but also serves as an inner abutment that limits the radially inwardly oriented flow of material caused by the tapered portion 13 of the Dietz die pressing on the metal sheet, resulting in the opening 18 having a smaller diameter than the original opening 16. Moreover, in order to accommodate the extra material pushed aside by the portion 13 of the punching die of Dietz, the receiving surface or lower die 7 is provided with an upward bulge adjacent and surrounding the opening 15 as can clearly be seen in the figures and as stated in the English abstract. Note that this upward bulge is a substantial part of the invention disclosed in Dietz. This is contrary to the presently claimed invention as recited in each of independent claims 9 and 18 wherein the receiving surface or face is specifically stated to be substantially flat. Contrary to the position of the Examiner, Fig. 1 of Dietz does not show a flat receiving face for the lower tool 7 but rather a face with a taper of 0.5 degrees in order to receive the displaced material. Note that the embodiment of Fig. 3 of Dietz operates in essentially the same manner as the embodiment of Figs. 1 and 2, except that it converts a round hole 16 in the metal sheet 11 to a countersunk hole 20 of smaller diameter but with a square tapered cross-section end as can be seen in Fig. 3. The only embodiment of Dietz that actually punches a hole in the metal sheet 11 is that of Fig. 4, which clearly shows a punching die 23 with a constant diameter and converts a smaller hole 21 to a larger hole 22 as shown in Fig. 4. Note that this actual punching embodiment of Fig. 4 does have a substantially flat receiving substrate for the metal sheet because in this case metal is being removed as

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a slug as opposed to being displaced to a new position as a result of the taper or slope of the receiving substrate. Accordingly, for at least the above stated reasons, it is submitted that independent claims 9 and 18, and claims 10-12, 16 and 17 dependent on claim 9 and claims 19 and 20 dependent on claim 18, are allowable over the Dietz reference under 35 U.S.C. §103(a). In this regard it is noted that these claims, during the prosecution of this application, were previously rejected over the Dietz reference, with the rejection being subsequently withdrawn based on the Examiners statement, following an interview, that "Element 14 of Dietz is not capable of being used as a punch. Therefore the rejection of 10/18/2006 is withdrawn" (see Office Communication dated January 24, 2007).

In addition to the above, it is noted that contrary to the statement of the Examiner, the die of Dietz does not have three parts including a shaft 2, a first part 6 and a second cylindrical part 14. Rather the die of Dietz includes only the cylindrical shank 6 which transitions via the portion 13 into the cylindrical centering portion or guide 14 at one end. The part 2 identified by the Examiner as the claimed shaft is not part of the die itself, but rather a holder for the die (see English Abstract). Thus there is no guide through which the shaft extends and which guides the die shaft as required by each of claims 9 and 18. Accordingly, for these additional reasons, it is submitted that claims 9-12 and 16-21 are allowable over the Dietz reference.

In an attempt to overcome the deficiencies of the Dietz reference, the Examiner has cited the Takashima reference, which relates to forming holes with a lower cylindrical portion and with a tapered portion at one end in very thin stainless steel

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sheets for use in ink jet printers. This patent does teach that such a cylindrical hole with a tapered end can be formed with a single tool 5 having a first part 5c and a second punching part 5b as shown in Figs 1-3. However, this reference teaches that in order to achieve this result, the operative or punch 5 should have a first portion 5a with a forward taper and a second portion 5b that tapers in the reverse direction (see paragraph 0018). Thus both portions 5a and 5b of the operative 5 are tapered and thus punching part 5b is not cylindrical as required by claims 9 and 18. Note that the Takashima reference does not teach that the die should enter a hole or opening on its punching stroke to provide guidance as in Dietz and as in the present invention, which would appear to be difficult in view of the direction of taper of the part 5b. In any case, if the Takashima part 5b were substituted for the guide part 14 of Dietz a tapered portion would result. Note further that since the Takashima et al reference deals with a tapered punch or operative, it is not concerned with the problem of length/diameter ratio since a tapered punch is inherently stiff due to the increasing diameter as its basis. Note further that Dietz does not wish to form any holes in a metal sheet with the devices of Figs. 1-4, but only to reduce the diameter of an existing hole and provide the newly formed hole with the tapered end. Thus one would not consider making the guide portion a cutting portion as suggested by the Examiner since there is no desire to do so, and moreover the bulged receiving surface would cause problems with the any opening that could be made. Certainly, if the substitution seemingly suggested by the Examiner of only using the teaching of Takashima to convert the guide portion 14 of Dietz were so obvious, Dietz would have done so since he already provides a punching embodiment in Fig.4.

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In any case, the Takashima reference, even if combined with the Dietz reference in some manner would not result in the invention defined in claims 9 and 18 and the claims dependent thereon. Accordingly, for the above stated reasons, it is submitted that claims 9-12 and 16-20 are allowable over the combination of the Dietz and Takashima references under 35 U.S.C. §103(a).

Claim 12

Claim 12 recites that the die guide device includes a bush or bushing (18) through which the shaft (15) of the die (8) extends, with the bushing having a passage that defines a guide surface for the outer surface of the shaft (15). As pointed out above there is no such guide arrangement in the device of Dietz since there is only a two part die, i.e., the device (2) of Dietz is not part of the die, but rather a holder for the main portion (6) of the Dietz die. Accordingly, for this additional reason, it is submitted that claim 12 is allowable over the cited combination of references.

Rejection of claims 1-3, 5-7 and 15 under 35 U.S.C. §103(a)

In rejecting claims 1-3, 5-7, and 15 under 35 U.S.C. §103(a) as being unpatentable over the Dietz reference in view of the references to Saito and Takashima, the Examiner has cited the patent to Saito simply to show that it is known to provide a receiving device with a plurality of punched holes. This is readily admitted although the reason for the plurality of punched holes in the receiver according to the present invention is to permit a plurality of holes to be simultaneously punched using a plurality of similar dies and not to accommodate different size punches.

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Claim 1 essentially contains all of the limitations of claim 9 as discussed above, although in different terms and with a slightly broader scope. Accordingly, it is submitted that claim 1 and claims 2, 3 and 5-7 dependent on claim 1 and claim 15 dependent on claim 9 are allowable over the combination of the Dietz and Takashima references for essentially the same reasons as discussed above with regard to claim 9. Moreover, the patent to Saito, which was cited simply to show that it is known to provide a receiving device with a plurality of holes, does not overcome the deficiencies of the Dietz-Takashima combination of references as discussed above. In this regard it is pointed out that these claims were rejected during the prior prosecution over the Dietz-Saito combination of references, with the rejection being subsequently withdrawn as noted above with the other claims. Accordingly, it is further submitted that claims 1-3, 5-7, 14 and 15 are allowable over the combination of the Dietz, Takashima and Saito references under 35 U.S.C. §103(a).

Claim 3

Claim 3 contains the same limitations as claim 12 discussed above, and consequently is submitted to additionally be allowable for the same reasons as claim 12 discussed above.

Claims 5 and 15

Claims 5 and 15, dependent on claims 1 and 9, respectively, each recite that the length of the punching portion (26) is essentially equal to the length of the stroke of the drive mechanism. In rejecting these claims, the Examiner has taken the position that it would be obvious to arrive at this relationship. However, if the device of Dietz, either as

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disclosed or as supposedly modified by the Examiner were given as stroke length as recited in these claims, it could not function to provide the tapered end of the opening. That is if the stroke length is equal to the length of the guiding portion (14) of Dietz, the tapered portion (13) of the Dietz die would not engage the metal sheet and perform its function. Accordingly, for this additional reason, it is submitted that claims 5 and 15 are allowable over the cited combination of references under 35 U.S.S 103.

Conclusion

For the above-stated reasons, it is submitted that all of the pending claims, i.e., claims 1-3, 5-7, 9-12 and 15-20, are allowable over the references and rejections of record and are in condition for allowance. Therefore, reversal of the Examiner's final rejection and allowance of these claims is respectfully requested.

Respectfully submitted,

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Claims Appendix

1. A device for punching unfired, sheetlike ceramic substrates, in particular so-called green sheets, comprising:

a receiving device, which has a substantially flat receiving face for a ceramic substrate, and in which punched holes are embodied;

at least one die, which is disposed above an associated respective punched hole and has a shaft and an operative portion that extends through a constant diameter stripper opening, which is disposed in a stripper above the associated respective punched hole and extends to an outer face of the stripper facing the receiving face, with the operative portion having a first part with a diameter that is less than the diameter of the shaft by a multiple of the diameter of the first part, and greater than the diameter of the associated punched hole, and the first part of the operative portion, at its lower end, has a cylindrical punching portion whose diameter is somewhat less than the diameter of the punched hole and whose length is less than the length of the stripper opening;

a drive mechanism, which is connected in driving fashion to the die in order to move linearly by a defined stroke and in the process to move the punching portion into the punched hole and out of it; and,

a die guide device, through which the shaft extends and which guides the die at its shaft.

2. The punching device of claim 1, wherein the punching portion is unguided in a transverse direction.

3. The punching device of claim 1, wherein the die guide device includes a bush with a passage which defines a guide face for the outer surface of the shaft.

4. (Cancelled)

5. The punching device of claim 1, wherein the length of the punching portion is essentially equal to the length of the stroke of the drive mechanism.

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6. The punching device of claim 1, wherein the length of the operative portion is greater than the stroke of the drive mechanism.

7. The punching device of claim 1, wherein the punched hole is a through bore, which opens into a slug conduit which has a greater diameter than the punched hole.

8. (Cancelled)

9. A device for punching sheet-like substrates, comprising:

a receiving device having a substantially flat receiving face for a ceramic substrate, and having a punched hole formed in the flat surface;

a die disposed above the punched hole, said die having a shaft, and an operative portion that extends through and is guided in a constant diameter stripper opening disposed in a stripper above the punched hole and extending to an outer surface of the stripper facing the receiving face, said operative portion including a first part that is guided by a surface defining the stripper opening and has a diameter that is less than the diameter of the shaft and greater than the diameter of the punched hole, and a second cylindrical punching part that is disposed at a lower end of the first part, and has a diameter that is less than the diameter of the first part and slightly less than the diameter of the punched hole and a length that is less than the length of the stripper opening so that a portion of the first part is always guided within the stripper opening, and with the diameter of the shaft being a multiple of the diameter of the first part of the operative portion;

a drive mechanism connected in driving fashion to the die to move the die linearly by a defined stroke and in the process move the punching part into and out of the punched hole; and,

a die guide through which the shaft extends and which guides the die shaft.

10. The punching device of claim 9, wherein the shaft, and first part of the operative portion of the die are each cylindrical.

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11. The punching device of claim 9, wherein the punching part is unguided in the transverse direction in the stripper opening.

12. The punching device of claim 9, wherein the die guide device includes a bush through which the shaft extends, with the bush having a passage that defines a guide surface for the outer surface of the shaft.

13. (Cancelled)

14. (Cancelled)

15. The punching device of claim 9, wherein the length of the punching part is essentially equal to the length of the stroke of the drive mechanism.

16. The punching device of claim 9, wherein the length of the operative portion is greater than the stroke of the drive mechanism.

17. The punching device of claim 9, wherein the diameter of the first part is less than the diameter of the stripper opening by a clearance amount.

18. A tool for punching sheet-like substrates, comprising:

a lower tool part having a substantially flat receiving face for a substrate, and having a punched hole formed in the flat surface;

an upper tool part;

a die having a shaft, and a graduated operative portion including a first part having a diameter that is less than the diameter of the shaft and greater than the diameter of the punched hole, and a second cylindrical punching part disposed at a lower end of the first part and having a diameter that is less than the diameter of the first part and slightly less than the diameter of the punched hole, and with the diameter of the shaft being a multiple of the diameter of the first part of the operative portion;

a linear die guide disposed in the upper tool part above the punched hole;

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a stripper bush mounted on a surface of the upper tool part facing the lower tool part and having a constant diameter stripper opening disposed above the punched hole and extending to an outer surface of the stripper bush facing the receiving surface;

said die being disposed above the punched hole and mounted in the upper tool part for linear movement toward and away from the lower tool part, with the shaft of the die being disposed in and guided by the linear die guide, the second punching part of the operative portion having a length that is less than the length of the stripper bush, and the first part of the operative portion of the die always extending into the stripper opening and being guided by a wall of the stripper bush defining the stripper opening; and,

a drive mechanism connected in driving fashion to the die to move the die linearly by a defined stroke and in the process move the punching part into and out of the punched hole.

19. The punching device of claim **18**, wherein the shaft, and first part of the operative portion of the die are each cylindrical.

20. The punching device of claim **19**, wherein the diameter of the first part is less than the diameter of the stripper opening by a clearance amount.

21. (Cancelled)

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Evidence Appendix

None

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Related Proceedings Appendix

There are no related proceedings.